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Language: JAPANESE [JP, 2001-110939.A]

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1. JP, 2001-110939.A

## CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

### DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the printed circuit board used for electronic equipment, an electrical machinery and apparatus, a computer, communication equipment, etc. Furthermore, it is related with the substrate for semiconductor packages carrying a semi-conductor.

[0002]

[Description of the Prior Art] Generally, solder resist pattern formation is performed, electrolysis nickel and gold plate (it is hereafter written as nickel/gold) are performed to a semiconductor device loading side (it is hereafter written as a component side), and a solder ball loading side (it is hereafter written as a solder side) by the flow line for partial electrolytic plating the back after forming a circuit pattern in a substrate, and the substrate for semiconductor packages is manufactured.

[0003]

[Problem(s) to be Solved by the Invention] Although reservation of the flow line for partial electrolytic plating is becoming difficult and corresponds to thinning, multilayering, and densification in connection with the densification of wiring, also in quality, there are still many problems also in cost.

[0004] Moreover, to the component side, electrolysis nickel / gold is desirable in wire-bonding nature, and the PURIFURAKKUSU processing coat is superior to nickel / golden coat in the substrate for semiconductor packages, in the wettability of solder, and adhesion to the solder side. However, actualization becomes complicated, a manufacturing cost also becomes high, and it is a problem to secure the flow line for partial electrolytic plating, to form electrolysis nickel / golden coat in a component side, and to form a PURIFURAKKUSU processing coat in a solder side.

[0005]

[Means for Solving the Problem] In order to solve this technical problem, in BGA substrate manufacture, the substrate of the copper circuit pattern which does not have the lead wire for electroplating and which became independent, respectively is formed, a solder resist front face is roughened after pattern formation by the solder resist, non-electrolytic copper is deposited all over a substrate, it covers with a plating resist in a solder side, and dissolution removal of the non-electrolytic copper of a component side is carried out by etching. The pad of a component side and the non-electrolytic copper of the pad and solder side of a through hole and a solder side by which coppering was carried out are used as a flow object, and electrolysis nickel / golden coat is deposited in the copper pad of a component side. The plating resist of a solder side is removed, the back, the etching dissolution of the non-electrolytic copper of a solder side is carried out, and PURIFURAKKUSU processing is performed to the pad of a solder side the back. Although the flow line for partial electrolytic plating was formed in coincidence by the conventional approach at the time of circuit pattern formation By the approach of this invention, at the time of circuit pattern formation it is not necessary to form the flow line for partial electrolytic plating, and non-electrolytic copper is used as a flow object. The PURIFURAKKUSU coat which was excellent in the solder side further at solder nature in the electrolysis nickel / golden coat which formed electrolysis nickel / golden coat and was excellent in the component side the back at wire-bonding nature can be formed. Moreover, if the tooth space is used for densification by losing the flow line for partial electrolytic plating, it can respond also to small and light-ization further.

[0006] That is, this invention is a substrate for semiconductor packages which has electrolysis nickel / golden coat in a component side, and has the pad of a PURIFURAKKUSU coat in a solder side without needing the tooth space of the flow line for partial electrolytic plating. In the circuit board which has the through hole where coppering of this invention was carried out 1) The etching process 6 electrolysis nickel / gold plate process 7 of the non-electrolytic copper of plating resist formation process 5 component side of the process 4 solder side of surface roughening process 3 non-electrolytic copper plating of formation process 2 solder resist of a solder resist pattern it is the manufacture approach of the substrate for semiconductor packages by performing etching process 9 PURIFURAKKUSU down stream processing of the non-electrolytic copper of the removal process 8 solder side of the plating resist of a solder side of having electrolysis nickel / golden coat in a component side, and having a PURIFURAKKUSU coat in a solder side. This invention is the manufacture approach of the substrate for semiconductor packages of a PURIFURAKKUSU coat in electrolysis nickel / golden coat, and a solder side at the component side by using non-electrolytic copper plating as a flow object for parcel plating, and carrying out etching removal.

[Embodiment of the Invention]

[0007] The operation gestalt of this invention is explained in full detail below. the printed circuit board used for this invention -- as 5-70 commercial micrometers of copper foil and a commercial insulating base material -- an epoxy resin, polyimide resin, bis-maleimide triazine (BT) resin, and PPE resin -- or PURIFUREGU which infiltrated this resin into a glass fiber, a glass fabric, or paper was piled up, and the copper foil double-sided substrate or the multilayer substrate was created. The thickness of the substrate is a 0.05-2.4mm substrate.

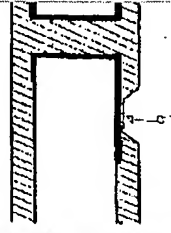
[0008] Next, the hole was formed in the copper-foil face with a drill or laser, the flow was secured by plating and the circuit pattern was formed for copper by etching the back using print processes or the photoresist sheet method. The BGA substrate and CSP substrate which are used for this invention referred to the "printed circuit technical handbook" (volume on printed circuit society), and created it. Also in a printed circuit board, this invention demonstrates the outstanding effectiveness in the BGA substrate for semiconductor packages, and a CSP substrate especially.

[0009] This invention performs the following down stream processing one by one in the circuit board which has the through hole where coppering was carried out for semiconductor packages.

[0010] 1) Or it arrives, a solder resist to the part besides the individual reason which a solder side should carry out PURIFURAKKUSU processing the individual reason which should carry out

Drawing selection

Representative drawing



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[Translation done.]

[0009] This invention performs the following down stream processing one by one in the circuit board which has the through hole where coppering was carried out for semiconductor packages.

[0010] 1) Or it applies a solder resist to the part besides the individual reason which a solder side should carry out PURIFURAKKUSU processing the individual reason which should carry out partial electrolytic plating of the component side of the formation process circuit board of a solder resist pattern outside, carry out alkali treatment of the part which should apply and carry out photo-curing of the photoresist solder resist to each field of the circuit board, and should plate un-hardening the back, and the part which should carry out PURIFURAKKUSU processing, and form a solder resist pattern. As for a solder resist, the various solder resists of a photo-curing mold and a heat-curing mold are used. For example, Taiyo Ink Mfg. PSR-4000 grade is mentioned. The approach of spreading that generally the approach of spreading is used, for example, screen printing, the roll coater method, the spray-coater method, the curtain coating-machine method, the dip coater method, etc. are used.

[0011] 2) By potassium permanganate or the potassium chromate, carry out etching processing, roughen the solder resist side stiffened before the surface roughening process electroless deposition of a solder resist, and improve the adhesion of electroless deposition copper.

[0012] The drug solution generally used is used about the non-electrolytic copper plating liquid used at the following processes, a software etching reagent, electrolysis nickel / liquid gilding, and water-soluble PURIFURAKKUSU liquid.

[0013] 3) Non-electrolytic copper plating is performed all over the substrate side which was not applied not to mention the whole surface of the process solder resist of non-electrolytic copper plating. This secures the flow object of partial electrolytic plating. The presentations of liquid are a Rochell salt bath, an EDTA bath, etc., and perform coppering to the whole surface. As copper thickness, it is 0.2-1.0 micrometers and the whole surface is covered by the metal copper coat.

[0014] 4) Carry out plating resist formation to a solder side in a plating resist formation process solder side. By forming a plating resist, etching of a solder side is prevented at the etching process of the non-electrolytic copper of five component sides. As a plating resist, it forms by spreading of a liquefied resist, or attachment of a dry film. For example, SANFOTO by Asahi Chemical [Co., Ltd.] Co., Ltd. is used. Deform to electroless deposition, or electrolysis nickel / gold plate, it dissolves, or the stable film not exfoliating is used.

[0015] 5) This process is a process which carries out etching removal of the non-electrolytic copper of a component side like etching of non-electrolytic copper. As for an etching solution, the so-called software etching reagent or the so-called etching reagents, such as persulfate, a sulfuric acid-hydrogen-peroxide solution, and a ferric chloride, the solution of hydrochloric acid of a cupric chloride, are used. There is also effectiveness of raising the adhesion of electrolysis nickel / gold plate coat, by changing into the condition of having roughened the copper surface of a component side, by this approach.

[0016] 6) Use the non-electrolytic copper of electrolysis nickel / gold plate process solder side as a flow object for partial electrolytic plating. It has connected electrically through the flow of the ball pad of a solder side, and the pad of the through hole and component side by which coppering was carried out, and electrolysis nickel / golden coat is deposited in the copper pad side of the exposed component side by electrolytic plating, for example, nickel-plating conditions -- the electrolytic plating in a Watts bath and a sulfamic acid bath, and gold plate conditions -- wirebonding -- public funds -- OUBOBERU of plating liquid, Inc., for example, Metex. ORUNA of Kamamura Industry, the tempoh resist liquid of Japanese High grade Chemistry, etc. perform.

[0017] 7) Remove the removal process of the plating resist of a solder side, then the plating resist of a solder side (it exfoliates for example, in an alkaline water solution), and expose the solder resist side where non-electrolytic copper plating of the solder side was carried out.

[0018] 8) By the same approach as the etching process of the non-electrolytic copper of the component side of the etching process 5 of the non-electrolytic copper of a solder side, carry out etching removal of the non-electrolytic copper of the garbage of a solder side, and form an independent copper circuit pattern. By this approach, it changes into the condition of having roughened the copper surface of a solder side, and there is also effectiveness of carrying out PURIFURAKKUSU processing and raising the adhesion of a PURIFURAKKUSU coat. On the other hand, at this etching process, the effect of the dissolution etc. does not receive the electrolysis nickel / golden coat of a component side.

[0019] 9) Carry out PURIFURAKKUSU processing to a PURIFURAKKUSU down-stream-processing solder side, and form a PURIFURAKKUSU coat in it. oxidation of the copper surface which is carrying out retention period China-Russia appearance of this coat, and prevention of dirt -- it carries out for the purpose of improvement in soldering nature further. As PURIFURAKKUSU processing, although any approach is possible, PURIFURAKKUSU processing (it processes with the drug solution of for example, an alkyl imidazole system) of an adsorption mold is especially effective. The art is based on immersion, a spray, etc. in a solder side.

[0020] As mentioned above, by performing one to 9 process, the substrate for semiconductor packages which has electrolysis nickel / golden coat in a component side, and has the pad of a PURIFURAKKUSU coat in a solder side could be manufactured, and the manufacture approach was established.

[0021]

[Example] Hereafter, the example of this invention is explained based on a drawing. The used BGA substrate referred to the "printed circuit technical handbook" (volumes on printed circuit society), and the substrate of the independent copper circuit pattern which does not have the lead wire for partial electrolytic plating was formed and used for it.

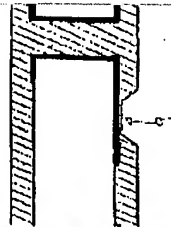
1) The solder resist used by formation process this invention of a solder resist pattern is PSR-4000 of Taiyo Ink Mfg., Inc. The solder resist was applied to both sides of the substrate in which the copper circuit pattern was formed, with screen printing, after ultraviolet-rays exposure, alkali development was carried out and the pattern was formed.

2) [Drawing 1] which processed the substrate in which the surface roughening process solder resist pattern of a solder resist was formed, in alkaline potassium permanganate, and etched the solder resist front face.

3) A non-electrolytic copper coat is deposited on the whole surface with the process Rosell salt bath of non-electrolytic copper plating. Copper thickness was 0.3 micrometers. [Drawing 2] to

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CLAIMS

[Claim(s)]

[Claim 1] The substrate for semiconductor packages which has the pad of a PURIFURAKKUSU coat in a semiconductor device loading side in electrolysis nickel and a golden coat, and a solder ball loading side [claim 2] In the circuit board which has the through hole by which coppering was carried out 1) Etching process 6 electrolysis nickel of non-electrolytic copper plating of the process 5 semiconductor-device loading side which forms a plating resist in the process 4 solder ball loading side of surface roughening process 3 non-electrolytic copper plating of formation process 2 solder resist of a solder resist pattern To the semiconductor loading side characterized by performing etching process 9 PURIFURAKKUSU down stream processing of non-electrolytic copper plating of the plating resist removal process 8 solder ball loading side of a gold plate process 7 solder ball loading side, and electrolysis nickel and a golden coat. The manufacture approach of the substrate for semiconductor packages of having the pad of a PURIFURAKKUSU coat in a solder ball loading side [claim 3] The manufacture approach of the substrate for semiconductor packages of having the pad of a PURIFURAKKUSU coat the back as a flow object for partial electrolytic plating in electrolysis nickel and a golden coat, and a solder ball loading side using non-electrolytic copper plating in the semiconductor loading side according to claim 2 characterized by carrying out etching removal

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DESCRIPTION OF DRAWINGS		[Translation done.]	
[Brief Description of the Drawings]		[Translation done.]	
[Drawing 1] The printed circuit board in which the pattern of a solder resist was formed to both sides		[Translation done.]	
[Drawing 2] The printed circuit board which deposited the non-electrolytic copper coat on the whole surface		[Translation done.]	
[Drawing 3] The printed circuit board which stuck the plating resist on the solder side		[Translation done.]	
[Drawing 4] The printed circuit board which dissolved the non-electrolytic copper coat of a component side		[Translation done.]	
[Drawing 5] The printed circuit board which formed electrolysis nickel / golden coat in the component side		[Translation done.]	
[Drawing 6] The printed circuit board which removed the plating resist of a solder side		[Translation done.]	
[Drawing 7] The printed circuit board which dissolved the non-electrolytic copper coat of a solder side		[Translation done.]	
[Drawing 8] The substrate for semiconductor packages which formed electrolysis nickel / golden coat in the component side, and formed the PURIFURAKKUSU coat in the solder side		[Translation done.]	
[Description of Notations]		[Translation done.]	
1: Insulating layer		[Translation done.]	
2: Copper pattern		[Translation done.]	
3: The through hole by which coppering was carried out		[Translation done.]	
4: Solder resist side		[Translation done.]	
5: Non-electrolytic copper plating side		[Translation done.]	
6: Plating resist side		[Translation done.]	
7: The roughened copper pattern side		[Translation done.]	
8: Electrolysis nickel / gold plate coat		[Translation done.]	
9: PURIFURAKKUSU coat		[Translation done.]	
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